Background material for presentation on Modeling, Forecasting, and Retrospective Analyses

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The Alaska Region's Integrated Ecosystem Assessment (IEA) Program focuses on delivering EBFM scientific advice from indicators, models, and other research results to management bodies. The four large marine ecosystems (LMEs) of the Alaska Region – the Eastern Bering Sea, the Gulf of Alaska, the Aleutian Islands, and the High Arctic – each have different sets of pressures, drivers, and responses, and therefore different management concerns, albeit with many similarities. As IEAs are inherently place-based, the Alaska program is envisioned as four separate IEA processes, one for each LME.

The development of IEAs in each LME has been driven by the AFSC's strong partnership with the North Pacific Research Board, which has funded Integrated Ecosystem Research Programs (IERPS) of fieldwork and modeling for the Bering Sea (starting in 2008), the Gulf of Alaska (starting 2011) and the High Arctic (currently in proposal stage). Each of these IERPs has brought major advances in synthetic ecosystem understanding. As the Bering Sea Project was nearing completion in 2011, the AFSC's IEA program focused on operationalizing key results into ongoing management products. This included developing indicators from IEA work, creating a modeling suite of comparable biological interaction models, performing management strategy evaluations with stakeholder involvement, and using model results to feed back to field work modifications. The Gulf of Alaska IERP is currently in its "synthesis" phase, and this year the IEA team has begun a similar process scoping GOA results for management inclusion. In each LME, the aim is to develop a portfolio of operationally-provided IEA products that include all stages of the IEA loop.

This work is also being formalized as part of the Bering Sea Fisheries Ecosystem Plan (FEP). A scoping document for the FEP was approved by the North Pacific Fisheries Management Council in December 2015. In order to make the FEP a "living" document with management impact, it has been envisioned as a set of Action Modules that can be added over time, each specifying research to be performed and potential management responses.

A primary vehicle for advice delivery is the Alaska Marine Ecosystem Considerations report, an annual product that synthesizes indicators and model results into ecosystem-level management advice. It is primarily a text-based product, published as a chapter of the AFSC Groundfish Stock Assessment and Management Evaluation (SAFE) report and presented annually to the NPFMC in the immediate context of quota-setting. It is reviewed annually by the Council's SSC, and its advice has been used to make precautionary adjustments to fishing quotas. A key aspect of this is the "synthesis" conducted by a team of analysts each year, to connect individual indicators to overall ecosystem/cumulative trends and recommend management actions when warranted. In the 2016/2017 cycle, it is being re-structured as four independent reports, one per LME, with Report Cards, Assessments, and Hot Topics (topics of importance for NPFMC attention) separate for each. The EBS and GOA are considered "full reports" while

the Aleutian Islands and High Arctic are limited due to both data limitations and management focus.

Specific challenges with this IEA work include managing a “portfolio” of coordinated projects across multiple LMEs and AFSC labs, and ensuring ecosystem coverage is comprehensive. To that end, an upcoming project is the development of “Conceptual Models” of the EBS and GOA LMEs, describing the linkages between ecosystem components and identifying gaps in knowledge and research.

One identified need within the Center is the need for coordinated studies of a range of post-juvenile fish species and their interactions in the ecosystem, including growth, feeding, maturity, migration behavior, and fisher response. Over the last few years, the coordination of recruitment work through the Center’s RPA has aided in bringing multiple products to management; a similar effort for commercial-aged species would greatly enhance the Center’s provision of ecosystem advice.